OBITUARY NOTICES OF FELLOWS DECEASED.

Captain Sir Frederick J. O. Evans, R.N., K.C.B. There have been few men perhaps who, launched into the active and engrossing professional duties of the Naval Service, at a period of life when their compeers in other callings had scarcely entered on their college course, who have achieved so solid a reputation for scientific eminence as the subject of this notice.

The only son of Mr. John Evans, a Master in the Royal Navy, Frederick Evans was born at Southsea, in March, 1815, and at the age of thirteen entered the Navy on board His Majesty's ship "Rose," employed on the North American coast, and subsequently joined the "Winchester," carrying the flag of Sir E. G. Colpoys on the same station.

In 1833 he was transferred to the surveying vessel "Thunder," employed in the West Indies, and under the auspices of her gifted captain, Richard Owen, he found the opportunity of cultivating the science of nautical astronomy, surveying, and other branches of knowledge, and thus laid the foundation of his subsequent long, useful, and distinguished career. In 1836 he joined His Majesty's ship "Caledonia," the flagship in the Mediterranean, and afterwards erved in various other vessels on that and the African stations. He soon gained for himself the reputation of a skilful and accomplished navigator, and was rewarded by early promotion to the rank of master.

In the year 1841 Mr. Evans was selected to accompany Captain Francis Price Blackwood in command of an expedition, consisting of Her Majesty's ships "Fly" and "Bramble," for the survey of the eastern coast of Australia, and was attached to the former vessel as master and senior surveyor. For more than four years he took a very leading part in the important but harassing service of exploring and surveying—in a ship without the aid of steam—the intricate channels leading from the Coral Sea through the Barrier Reefs, the passages through Torres Strait, and the southern shores of New Guinea, regions then almost entirely unknown to the navigator. A narrative of this remarkable voyage was published in 1847 by J. B. Jukes, the naturalist to the Expedition.

After a short period of surveying service on the coasts of England, he was appointed to Her Majesty's ship "Acheron," fitting out under the late Admiral Stokes, for the survey of the coasts of the then young colony of New Zealand. On this service he was arduously engaged for a period of four years, and seamen of all nations are in

no small degree indebted to him for the excellence of the charts of these coasts, which have been in constant use to the present time.

In these two important expeditions Mr. Evans gained for himself the reputation of a scientific surveying officer, second to none in his profession. His great forte had always been extreme accuracy of observation and fidelity in execution, two qualities perhaps in no profession of more vital importance than in the calling of the nautical surveyor. Always painstaking and patient, sometimes thought to be over-fastidious, yet he was never outstripped in the race by his more ardent contemporaries, and the accuracy of his work was never questioned; during these two voyages he had paid considerable attention to the science of terrestrial magnetism, and had made frequent observations on the three elements, thus in a measure preparing himself for the important duties which were destined to devolve on him at a later period of his career.

After his return to England, at the end of 1851, he was for a considerable time employed at the Hydrographical Department of the Admiralty, in preparing the charts of New Zealand for publication, and on other nautical duties connected with that survey.

His abilities as a surveying officer had long been noticed by the then chief of the department, Sir Francis Beaufort, who was never slow to recognise and reward real merit; and it was on his nomination that, at the commencement of the Russian war, Mr. Evans was employed on reconnoitring service with the Baltic Fleet; for a year he was vigorously engaged on inshore service on the Russian coasts, and was present at the operations against Bomarsund and among the Aland islands, for which his name was mentioned in Gazetted Despatches; with this service his active career afloat ceased, after twenty-six years of constant employment, both in the regular and surveying branches of the Navy, and surely no man was more entitled than himself to look back with pride and satisfaction on a career of unremitting labour and enduring usefulness for so long a period.

A new era was now about to commence in the construction of the ships of the Royal Navy, and Captain Evans was destined for the next thirty years to take a leading part in the development of a science upon which the safety of their navigation was mainly to depend.

In 1855 he was appointed Chief of the Compass Department of the Admiralty; at this time our extensive Fleet was wholly of wood, partly composed of steam and partly of sailing ships. Our experience of the effects of magnetism in the iron vessels which had been constructed in the Mercantile Marine was extremely limited; the science of the subject, so far as it extended, was alone known to two or three individuals in Europe, and even that science was extremely mistrusted by all practical men, and further, numerous, and especially one

awfully fatal shipwreck (that of the "Royal Charter") had occurred to iron merchant vessels, which were officially traced to compass errors.

The force of circumstances at the close of the Russian war, as is well known, rapidly brought about the conviction that our war ships must be iron, and not only this, but that they must be armour-plated, and thus almost suddenly a question presented itself to science and practical knowledge, the difficulties of which have probably rarely been surpassed, viz., how to overcome the intricacies of magnetism in such ships. That the difficulty was surmounted is of course known, though at what cost of close and laborious investigation, theoretical and practical, for years, is known but to few.

That it was successfully and triumphantly overcome is mainly due to two individuals, viz., the late Mr. Archibald Smith, F.R.S., and the subject of this notice; and their names will ever be associated with the solution of a question the importance of which to a maritime nation cannot be over-estimated.

It is unnecessary to enter here into the scientific merits of Archibald Smith, they are of world-wide renown; suffice it for our purpose to say, that he was a mathematician of the highest order, had long gone into the question of terrestrial magnetism in connexion with compass disturbance *con amore*, had cheerfully joined Captain Evans in all his labours, and until his lamented death in 1872, was joint author and fellow worker in all their investigations.

The writer cannot here refrain from quoting words which have already appeared in connexion with this subject, and which so well express the connexion between the two men.*

"The subject was one which called for the combination of practical sagacity and experience, with refined scientific method, and if Archibald Smith was stronger on the one side, Captain Evans was his master on the other; nor was either of them without large powers, even in the special department of their joint labours, in which he owned the supremacy of his friend; it was an undertaking which called for the united efforts of just two such men as were fortunately brought together to do it, and the result has been a triumph to England, and a blessing to the world, which will preserve the memories of its authors as long as the ocean remains the highway of Englishmen and the world."

The first work which Captain Evans produced after his appointment as Chief of the Compass Department, was a chart of the world, showing the curves of equal magnetic declination; by which the navigator was enabled to obtain with approximate accuracy in any part of the ocean the deviation of his compass from the magnetic meridian; this chart was published by the Admiralty in 1858.

* "Nature," January 14th.

In 1859 he read a paper at the Royal United Service Institution, on the magnetism of iron ships, showing all that had been done up to that date in acquiring a knowledge of their magnetism and the treatment of their compasses.

His next paper was a report to the Admiralty of the magnetic character of the various types of iron ships in the Navy, and of the "Great Eastern" steamship. The results of this paper were to show the best magnetic direction for building an iron ship, the best position for placing her standard and other compasses, and the various sources of error affecting a compass under the most favourable conditions. This report was communicated to the Royal Society, and printed in the Transactions for 1860.

A joint paper on the proper length and arrangement of the needles on a compass card, with exact information as to proper arrangement of magnet and soft iron correctors with respect to it, was communicated to the Royal Society in 1861.

In 1862, the Admiralty published "The Manual for the Deviation of the Compass in Iron Ships;" this important work was the result of the joint labours of Evans and Archibald Smith. It was immediately translated into the principal European languages, and became the text-book of the maritime world. On the introduction of new types of armour-plated ships, new editions of the work became from time to time necessary, and were published.

In 1865 the joint authors produced another important paper on the magnetic character of the armour-plated ships of the Navy up to that date. The novelty of the form of ships thus discussed rendered the results of more than usual interest, and proved among other things with what degree of confidence compasses might be placed in positions where armoured protection would be afforded; this paper was also printed in the Transactions of the Royal Society.

The practicability of determining the magnetic coefficients without the labour of swinging, and the heeling error, without inclining the ship, was also demonstrated, and has been practically adopted in the Navy, with great saving of labour and expense.

In 1865, on the retirement of Captain Becher from the Hydrographic Department, Captain Evans succeeded him as Chief Assistant to the Hydrographer, retaining the position of Chief of the Magnetic Department. From this time his practical duties in regard to compass management devolved on his successor, though he never relaxed his investigations, or wearied in his devotion to the science of terrestrial magnetism, and in 1870, desiring to present the subject of compass deviation in a less elaborate form than had been done in the former publication, he brought out his "Elementary Manual," a work which was very well received, and was also translated by the maritime nations.

In the year 1874, a vacancy occurring for the post of Hydrographer of the Admiralty, he was selected to fill it; his habits of extreme accuracy and method, and his ripe and extended knowledge of the numerous and varied subjects which came within the province of that department to investigate and to deal with, rendered him peculiarly fitted to fulfil the duties of the position, which he continued to perform with equal ability and conscientiousness till within a little more than a year of his death; the multifarious calls of his new office, however, diverted him more and more from exclusive attention to his favourite science, though he still found time to draw up and read before the Royal Geographical Society in 1878, an able and instructive lecture on the Magnetism of the Earth, showing the distribution and direction of its magnetic force, and the changes in its elements, as then known.

Drawn together by the sympathies engendered by similar tastes and pursuits, he and the late Sir Edward Sabine had long been close friends and coadjutors, and during the last years of the labours of that distinguished *savant*, Evans had rendered him assistance in completing his great work, "Contributions to Terrestrial Magnetism," contained in the fifteen numbers of the "Magnetic Survey of the Globe," for the epoch 1842–5.

Science in this country has not always met with official encouragement, or reward, whether in, or outside of the public service, though it is the nation which is chiefly the gainer by it; and it was late in life before the valuable services rendered by Captain Evans to his own and other countries received any kind of recognition, though honorary rewards were proffered by foreign Governments. The explanation is perhaps, that the remedy for a serious difficulty was discovered before its existence had generally made itself felt, and that in the Naval profession it has been always a maxim that impossibilities arise only to be overcome in the ordinary course of duty.

In order to show, however, that these services were appreciated by the department with which he was immediately associated, the writer of this notice is induced to give an extract from a statement which nearly seventeen years ago it became his duty to place before the authorities in regard to them:—

. . . . . "When he found himself in the responsible position of head of the Compass Department, at a time when the complete revolution in shipbuilding raised the serious question whether it was possible so to deal with the magnetic influence of the iron which entered so largely into the construction and fittings of a modern ship as to retain the efficiency of the compass, he readily entered upon a task involving years of close and laborious investigation, experimental and theoretical, of the intricacies of an iron ship's magnetism; nor did he ever shrink from the responsibility of acting on

his acquired knowledge, and promptly recommending and carrying out improvements of system consequent on the change of circumstances, viz., an iron fleet superseding a wooden one. The compass system for the secure navigation of the Fleet under its remarkable changes, has grown entirely under his own hands, and has been marked by the following conditions :—

" 1st. Entire success ; for to the present time not a single ship of the Fleet has been lost or hazarded by default traceable to her compasses.

" 2nd. The principles involved are accepted by the navies of Europe and America.

" 3rd. The scientific value of his labours has in this country been recognised by his election into the fellowship of the Royal Society.

" 4th. The labours, whether experimental, or for purposes of investigation, by seeking the aid of men of science outside the naval profession, have cost the country nothing.

" 5th. Officers have been instructed by him, and works on the whole subject written and published, so that the knowledge has been diffused, and the results cannot be lost.

" But in addition to the security of the fleet and the establishment of the foundation of correct principles, he can claim the advantage that has accrued to the State of having by the system pursued, economised the great expenses that must have been incurred, had no system based on pure science existed : I allude to the time and enormous labour involved in swinging and heeling ships ; this for all ordinary cases has long been dispensed with, and the swinging alone is confined to times and circumstances, when it is chiefly necessary to give confidence to the officers of the ship.

" There is another point on which these sound principles operate : they effectually bar the door to individuals who come with quasi inventions, sometimes backed by officers of rank, well meaning but necessarily ignorant of the subject, professing to relieve all the troubles of compass management on board ship, and to leap over at a bound the labour of years of investigation, and all past experience ! The Admiralty is the special target at which these inventors aim, and the Government cannot be ignorant of a recent case where a very large and well supported demand on their credulity, and the public purse to follow, was defeated by the wise and persistent course of action adopted by Captain Evans ; these examples, more or less in their attempts on the national purse and on his responsibilities, have abounded during his tenure of office and mine, sometimes I fear to the no small engenderment of illwill and jealousy, but I am sure not to the diminution of the general respect for his character and recognition of his abilities." . . .

Captain Evans sat for many years on the Council of the Royal

Society, and was more than once a Vice-President. He was also a Fellow of the Royal Astronomical and Geographical Societies; he served for many years as a member of the Meteorological Committee of the Royal Society, and on the change in the constitution of that body he became a member of its Council.

In recognition of his public services the Companionship of the Bath was conferred on him in the year 1873, and in 1881 he was advanced to the Commandership of the same order on the recommendation of the Earl of Northbrook, the First Lord of the Admiralty, under whom he had served during the last five years of his career.

Sir Frederick Evans' last public service after his retirement from the Admiralty in June, 1884, was as the British delegate to the International Congress at Washington, convened for the establishment of a prime meridian, when that of Greenwich was adopted as the starting point from which longitude should in future be universally computed.

He died on the 20th of December, 1885.

G. H. R.